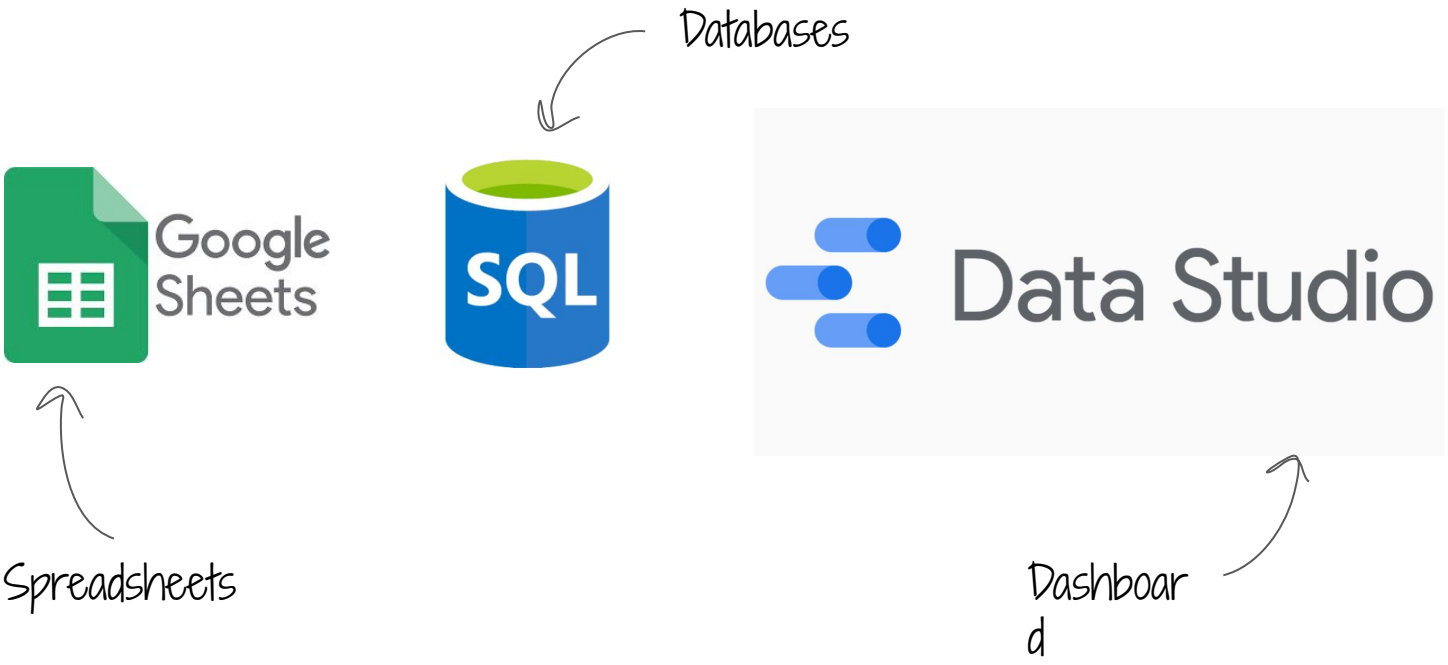
Google Sheets

Foundation for Everything (Else)

We're going to practice a lot.

Do or Do Not, There is no Try.

Data Analyst Skill Stack



Spreadsheets is basic requirement for Data Analyst

We assume you are familiar with Excel/ Sheets already

Google Sheets is free to use

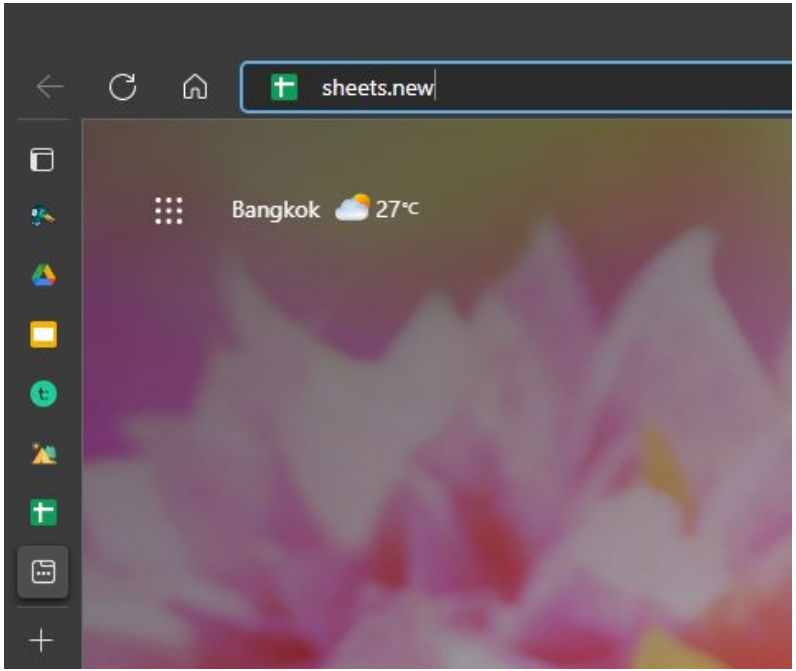
fx =10+5*A4

	A	B
1	**Intercept and Slope**	
2		
3	**x**	**y**
4	-10	=10+5*A4
5	-9	-35
6	-8	-30
7	-7	-25
8	-6	-20
9	-5	-15
10	-4	-10
11	-3	-5

-40 ×

Cells :)

Type `Sheets.new` in web browser



Open a new google sheets

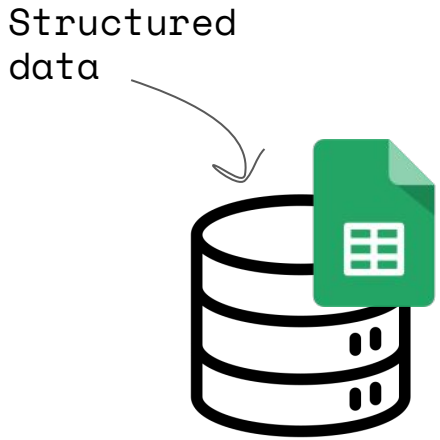
Course Outline

Content

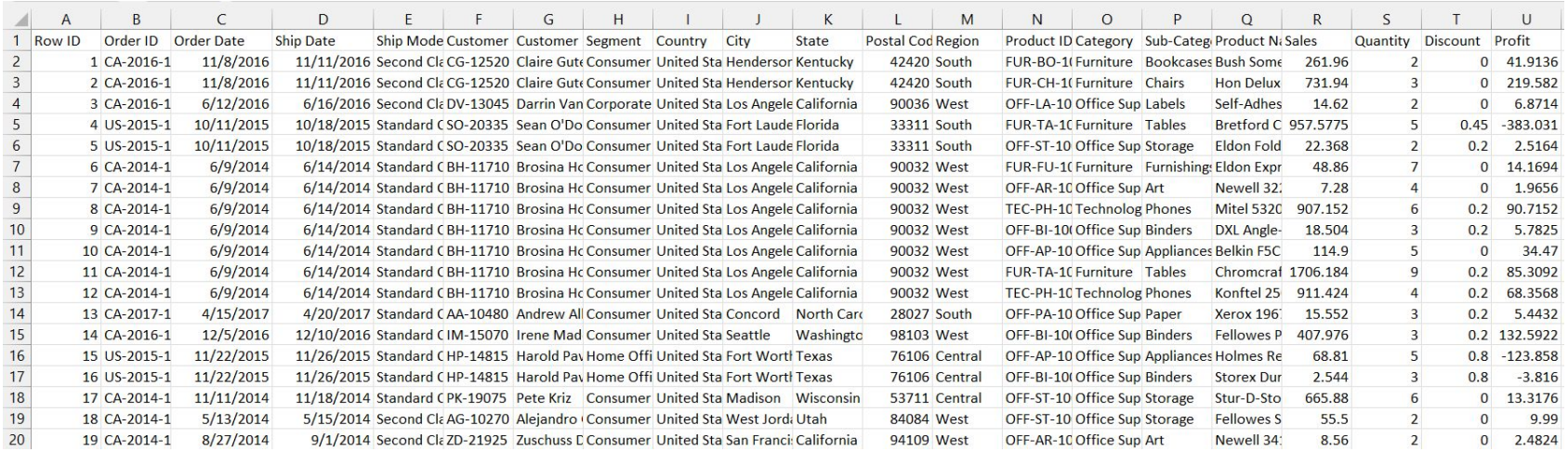
- Why spreadsheets
- What is function?
- Common functions for data analysts
- Dimension vs. Measurement
- Pivot Table
- Regular Expressions

Spreadsheets?

- Store data
- Manage data
- Clean and prepare data
- Make report
- Make data visualization/ dashboard



Structured data



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
1	Row ID	Order ID	Order Date	Ship Date	Ship Mode	Customer	Customer	Segment	Country	City	State	Postal Cod	Region	Product ID	Category	Sub-Categ	Product Na	Sales	Quantity	Discount	Profit
2	1	CA-2016-1	11/8/2016	11/11/2016	Second Cla	CG-12520	Claire Gute	Consumer	United Sta	Hendersor	Kentucky	42420	South	FUR-BO-10	Furniture	Bookcases	Bush Some	261.96	2	0	41.9136
3	2	CA-2016-1	11/8/2016	11/11/2016	Second Cla	CG-12520	Claire Gute	Consumer	United Sta	Hendersor	Kentucky	42420	South	FUR-CH-10	Furniture	Chairs	Hon Delux	731.94	3	0	219.582
4	3	CA-2016-1	6/12/2016	6/16/2016	Second Cla	DV-13045	Darrin Van	Corporate	United Sta	Los Angele	California	90036	West	OFF-LA-10	Office Sup	Labels	Self-Adhes	14.62	2	0	6.8714
5	4	US-2015-1	10/11/2015	10/18/2015	Standard C	SO-20335	Sean O'Do	Consumer	United Sta	Fort Laude	Florida	33311	South	FUR-TA-10	Furniture	Tables	Bretford C	957.5775	5	0.45	-383.031
6	5	US-2015-1	10/11/2015	10/18/2015	Standard C	SO-20335	Sean O'Do	Consumer	United Sta	Fort Laude	Florida	33311	South	OFF-ST-10	Office Sup	Storage	Eldon Fold	22.368	2	0.2	2.5164
7	6	CA-2014-1	6/9/2014	6/14/2014	Standard C	BH-11710	Brosina Ho	Consumer	United Sta	Los Angele	California	90032	West	FUR-FU-10	Furniture	Furnishing	Eldon Expr	48.86	7	0	14.1694
8	7	CA-2014-1	6/9/2014	6/14/2014	Standard C	BH-11710	Brosina Ho	Consumer	United Sta	Los Angele	California	90032	West	OFF-AR-10	Office Sup	Art	Newell 32	7.28	4	0	1.9656
9	8	CA-2014-1	6/9/2014	6/14/2014	Standard C	BH-11710	Brosina Ho	Consumer	United Sta	Los Angele	California	90032	West	TEC-PH-10	Technolog	Phones	Mitel 5320	907.152	6	0.2	90.7152
10	9	CA-2014-1	6/9/2014	6/14/2014	Standard C	BH-11710	Brosina Ho	Consumer	United Sta	Los Angele	California	90032	West	OFF-BI-10	Office Sup	Binders	DXL Angle-	18.504	3	0.2	5.7825
11	10	CA-2014-1	6/9/2014	6/14/2014	Standard C	BH-11710	Brosina Ho	Consumer	United Sta	Los Angele	California	90032	West	OFF-AP-10	Office Sup	Appliances	Belkin F5C	114.9	5	0	34.47
12	11	CA-2014-1	6/9/2014	6/14/2014	Standard C	BH-11710	Brosina Ho	Consumer	United Sta	Los Angele	California	90032	West	FUR-TA-10	Furniture	Tables	Chromcraf	1706.184	9	0.2	85.3092
13	12	CA-2014-1	6/9/2014	6/14/2014	Standard C	BH-11710	Brosina Ho	Consumer	United Sta	Los Angele	California	90032	West	TEC-PH-10	Technolog	Phones	Konftel 25	911.424	4	0.2	68.3568
14	13	CA-2017-1	4/15/2017	4/20/2017	Standard C	AA-10480	Andrew All	Consumer	United Sta	Concord	North Car	28027	South	OFF-PA-10	Office Sup	Paper	Xerox 196	15.552	3	0.2	5.4432
15	14	CA-2016-1	12/5/2016	12/10/2016	Standard C	IM-15070	Irene Mad	Consumer	United Sta	Seattle	Washingto	98103	West	OFF-BI-10	Office Sup	Binders	Fellowes P	407.976	3	0.2	132.5922
16	15	US-2015-1	11/22/2015	11/26/2015	Standard C	HP-14815	Harold Pav	Home Offi	United Sta	Fort Worth	Texas	76106	Central	OFF-AP-10	Office Sup	Appliances	Holmes Re	68.81	5	0.8	-123.858
17	16	US-2015-1	11/22/2015	11/26/2015	Standard C	HP-14815	Harold Pav	Home Offi	United Sta	Fort Worth	Texas	76106	Central	OFF-BI-10	Office Sup	Binders	Storex Dur	2.544	3	0.8	-3.816
18	17	CA-2014-1	11/11/2014	11/18/2014	Standard C	PK-19075	Pete Kriz	Consumer	United Sta	Madison	Wisconsin	53711	Central	OFF-ST-10	Office Sup	Storage	Stur-D-Sto	665.88	6	0	13.3176
19	18	CA-2014-1	5/13/2014	5/15/2014	Second Cla	AG-10270	Alejandro	Consumer	United Sta	West Jord	Utah	84084	West	OFF-ST-10	Office Sup	Storage	Fellowes S	55.5	2	0	9.99
20	19	CA-2014-1	8/27/2014	9/1/2014	Second Cla	ZD-21925	Zuschuss D	Consumer	United Sta	San Franci	California	94109	West	OFF-AR-10	Office Sup	Art	Newell 34	8.56	2	0	2.4824

Data types

- Numeric: 500, 25.5, 1002
- String: “Hello”, “Data Science”
- Boolean: TRUE, FALSE
- Date: “2022-05-03”

Text/ String

Always in double quote " "

```
= “I love Google Sheets”
= “Hello” & “ World”
= “I’m loving it”
= “I’m loving ” & B2
```

String concatenation

Data types guide our approach

$$x = [\ 30, 25, 50, 20, 15\ ]$$

summary statistics

sum(x) = 140
mean(x) = 28
min(x) = 15
max(x) = 50
count(x) = 5

Data types guide our approach

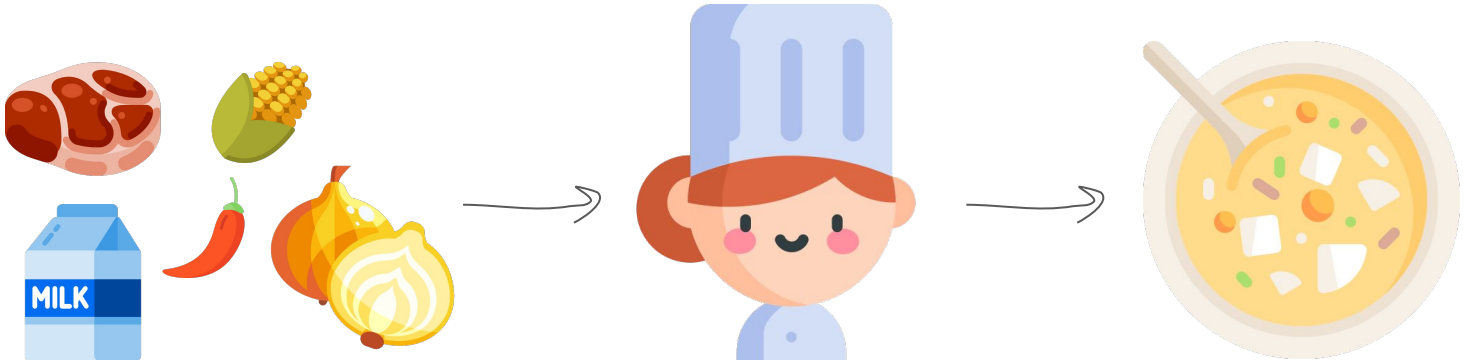
x = [🍎 🍎 🍊 🍌 🍋 🍊]

summary statistics

We can only **count** items
apple(2), orange(2), banana(1), lemon(1)

What is function?

How functions work



Input → Function → Output

Function anatomy

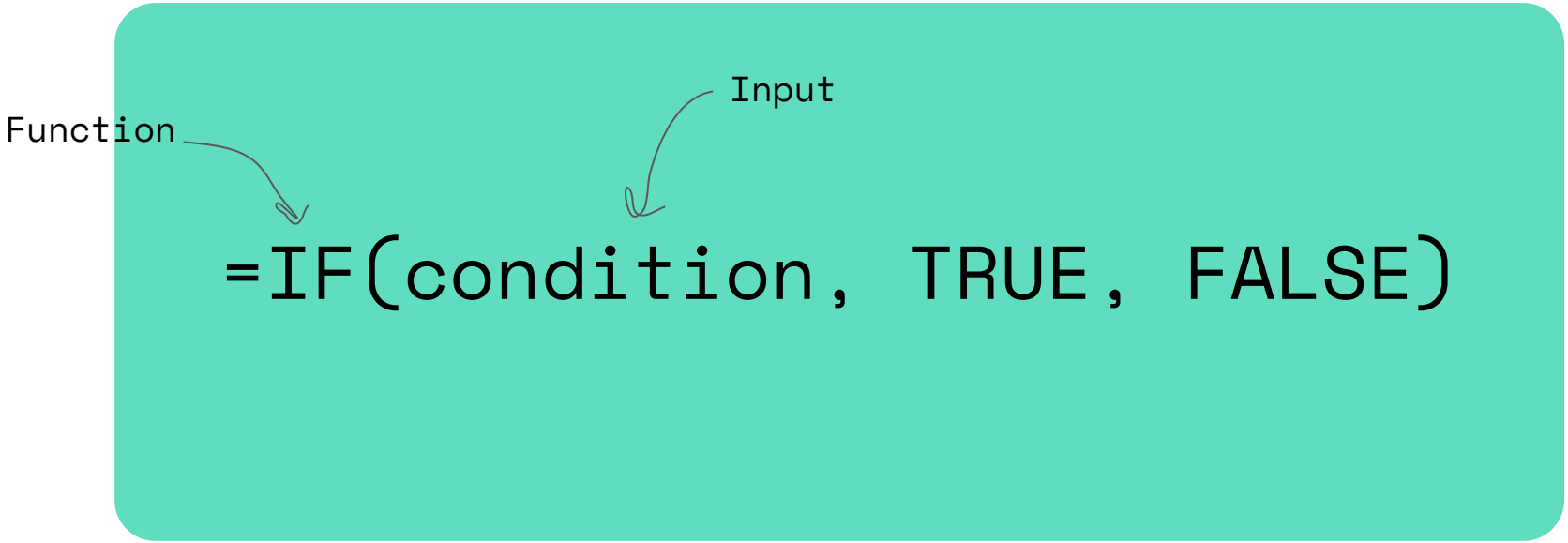
Function name

Required

```
=function(input1, [input2])
```

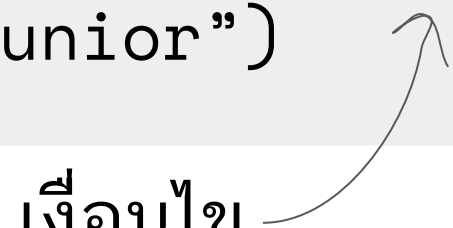
Optional

Legendary function



Create Condition

```
=IF( salary > 50000, “manager”, “junior”)
```



Create Multiple Conditions

```
=IFS( salary >  50000, “CEO”,
      salary >  30000, “manager”,
      salary <= 30000, “junior”)
```

ขึ้นบรรทัดใหม่ กด **ALT+ENTER**

Simple Analysis Functions

```
=COUNTA( employee )

=MIN( salary )
=MAX( salary )
=AVERAGE( salary )
=SUM( salary )
```

Common Functions

For data analysts

Common functions

- ❏ IF()
- ❏ IFS()
- ❏ COUNT()
- ❏ SUM()
- ❏ AVERAGE()
- ❏ VLOOKUP()
- ❏ COUNTIF()
- ❏ SUMIF()
- ❏ AVERAGEIF()
- ❏ FILTER()
- ❏ SORT()
- ❏ QUERY()

* only in Google Sheets

Secret Weapon

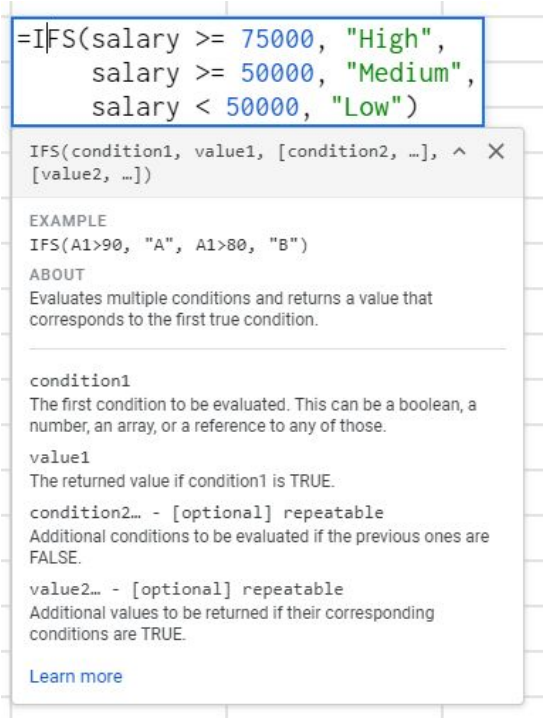
- ❏ REGEXMATCH() * only in Google Sheets
- ❏ REGEXEXTRACT()
- ❏ REGEXREPLACE()

Named range

E	F	G
salary	new_salary	email
$57,500	=ArrayFormula(SALARY*1.1)	
$19,500	$21,450	
$69,000	$75,900	
$55,000	$60,500	
$47,500	$52,250	
$100,000	$110,000	
$125,000	$137,500	
$42,500	$46,750	
$69,000	$75,900	
$49,500	$54,450	
$65,000	$71,500	
$18,500	$20,350	
$65,000	$71,500	

Name Range in formula

How to write multiple lines function



ALT + ENTER

Professional Tip

Name your dataset and reference it in your formula

```
=QUERY(IMDB, “select *”)
```

Example Dataset

ssn	lastname	firstname	hiredate	salary	gender	performance
000-01-0000	Milgrom	Patricia	10/1/2004	$57,500	Female	Average
000-02-2222	Adams	Sandy	1/15/2001	$19,500	Female	Excellent
109-87-6543	Wood	Emily	3/12/1997	$69,000	Female	Excellent
109-87-6544	Foster	Harold	8/14/2005	$55,000	Male	Good
111-12-1111	Johnson	James	5/3/1996	$47,500	Female	Good
123-45-6789	Coulter	Tracy	2/14/1993	$100,000		Good
222-23-2222	Marlin	Bill	3/28/1977	$125,000	Male	
222-52-5555	Smith	Mary	1/1/2006	$42,500	Female	Average
245-67-8910	Johanson	Sandy	6/2/2005	$69,000	Female	
333-34-3333	Manin	Emily	12/1/2000	$49,500	Female	Average
333-43-4444	Smith	Frank	1/29/1991	$65,000	Male	Good
333-66-1234	Brown	Marietta	3/7/2001	$18,500	Female	Excellent
335-55-5533	Jones	Holly	4/8/1986	$65,000	Female	Good
432-19-8765	Bronson	Paul	11/20/2003	$58,000	Male	Good
444-45-4444	Frank	Vernon	4/10/1985	$75,000	Male	Good
464-64-4466	Webster	David	1/29/1991	$58,500	Male	Excellent
500-50-0505	Rodriguez	Jose	7/16/1998	$150,000	Male	Good
555-22-3333	Rubin	Patricia	7/25/2003	$45,000	Female	Average
555-56-5555	Charles	Kenneth	6/18/1998	$40,000	Male	Excellent

Ask these questions

1. How many columns?
2. How many rows?
3. Is our data complete?

Filter data

	A	B	C	D	E	F	G
3	**ssn**	**firstname**	**lastname**	**hiredate**	**salary**	**gender**	**performance**
4	000-01-0000	Patricia	Milgrom	10/1/2004	$57,500	F	Average
5	000-02-2222	Sandy	Adams	1/15/2001	$19,500	F	Average
6	109-87-6543	Emily	Wood	3/12/1997	$69,000	F	Average
7	109-87-6544	Harold	Foster	8/14/2005	$55,000	M	Good
8	111-12-1111	James	Johnson	5/3/1996	$47,500	M	Good
9	123-45-6789	Tracy	Coulter	2/14/1993	$100,000		Good
10	222-23-2222	Bill	Marlin	3/28/1977	$125,000	M	
11	222-52-5555	Mary	Smith	1/1/2006	$42,500	F	Average
12	245-67-8910	Sandy	Johanson	6/2/2005	$69,000	F	
13	333-34-3333	Emily	Manin	12/1/2000	$49,500	F	Average
14	333-43-4444	Frank	Smith	1/29/1991	$65,000	M	Good
15	333-66-1234	Marietta	Brown	3/7/2001	$18,500	F	Poor
16	335-55-5533	Holly	Jones	4/8/1986	$65,000	F	Good
17	432-19-8765	Paul	Bronson	11/20/2003	$58,000	M	Good
18	444-45-4444	Vernon	Frank	4/10/1985	$75,000	M	Good
19	464-64-4466	David	Webster	1/29/1991	$58,500	M	Poor
20	500-50-0505	Jose	Rodriguez	7/16/1998	$150,000	M	Good
21	555-22-3333	Patricia	Rubin	7/25/2003	$45,000	F	Average
22	555-56-5555	Kenneth	Charles	6/18/1998	$40,000	M	Poor
23	612-99-1111	Melissa	Roberts	5/14/1984	$79,000	F	Good
24	625-62-6262	Holly	Holmes	6/15/1992	$55,000	F	Average
25	767-74-7373	William	Martin	8/26/2006	$23,000	M	Good
26	776-67-6666	David	Adamson	10/4/2002	$52,000	M	Poor
27	777-78-7777	Kelly	Marder	9/25/1997	$38,500	F	Average
28	925-45-7116	David	Whitehead	7/25/1980	$175,000	M	Good

Filter only the data you want

Filter data syntax

```
=FILTER( employee, salary<100000 )
```

dataset

condition

Sort data

ssn	firstname	lastname	hiredate	salary	gender	performance
333-66-1234	Marietta	Brown	3/7/2001	$18,500	F	Poor
000-02-2222	Sandy	Adams	1/15/2001	$19,500	F	Average
767-74-7373	William	Martin	8/26/2006	$23,000	M	Good
777-78-7777	Kelly	Marder	9/25/1997	$38,500	F	Average
555-56-5555	Kenneth	Charles	6/18/1998	$40,000	M	Poor
222-52-5555	Mary	Smith	1/1/2006	$42,500	F	Average
555-22-3333	Patricia	Rubin	7/25/2003	$45,000	F	Average
111-12-1111	James	Johnson	5/3/1996	$47,500	M	Good
333-34-3333	Emily	Manin	12/1/2000	$49,500	F	Average
776-67-6666	David	Adamson	10/4/2002	$52,000	M	Poor
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245-67-8910	Sandy	Johanson	6/2/2005	$69,000	F	
444-45-4444	Vernon	Frank	4/10/1985	$75,000	M	Good
612-99-1111	Melissa	Roberts	5/14/1984	$79,000	F	Good
123-45-6789	Tracy	Coulter	2/14/1993	$100,000		Good
222-23-2222	Bill	Marlin	3/28/1977	$125,000	M	
500-50-0505	Jose	Rodriguez	7/16/1998	$150,000	M	Good
925-45-7116	David	Whitehead	7/25/1980	$175,000	M	Good

Sort data from low to high (or high to low)

Sort data syntax

```
=SORT( employee, column_index, ascending )
```

dataset — column to sort — low to high

QUERY

Select and Where clauses

```
=QUERY( employee, “select *” )
```

dataset

SQL like syntax

Getting Data From Multiple Tables

EMP_ID	Name	Dept
1	Toy	DATA
2	John	HR
3	Mary	MKT

EMPLOYEE

EMP_ID	Salary	Branch
1	25000	Bangkok
2	50000	Seoul
3	35000	Seoul

COMPENSATION

EMP_ID	Name	Dept	Salary	Branch
1	Toy	DATA	=VLOOKUP(B4,COMPENSATION,2,FALSE)	
2	John	HR		
3	Mary	MKT	35000	

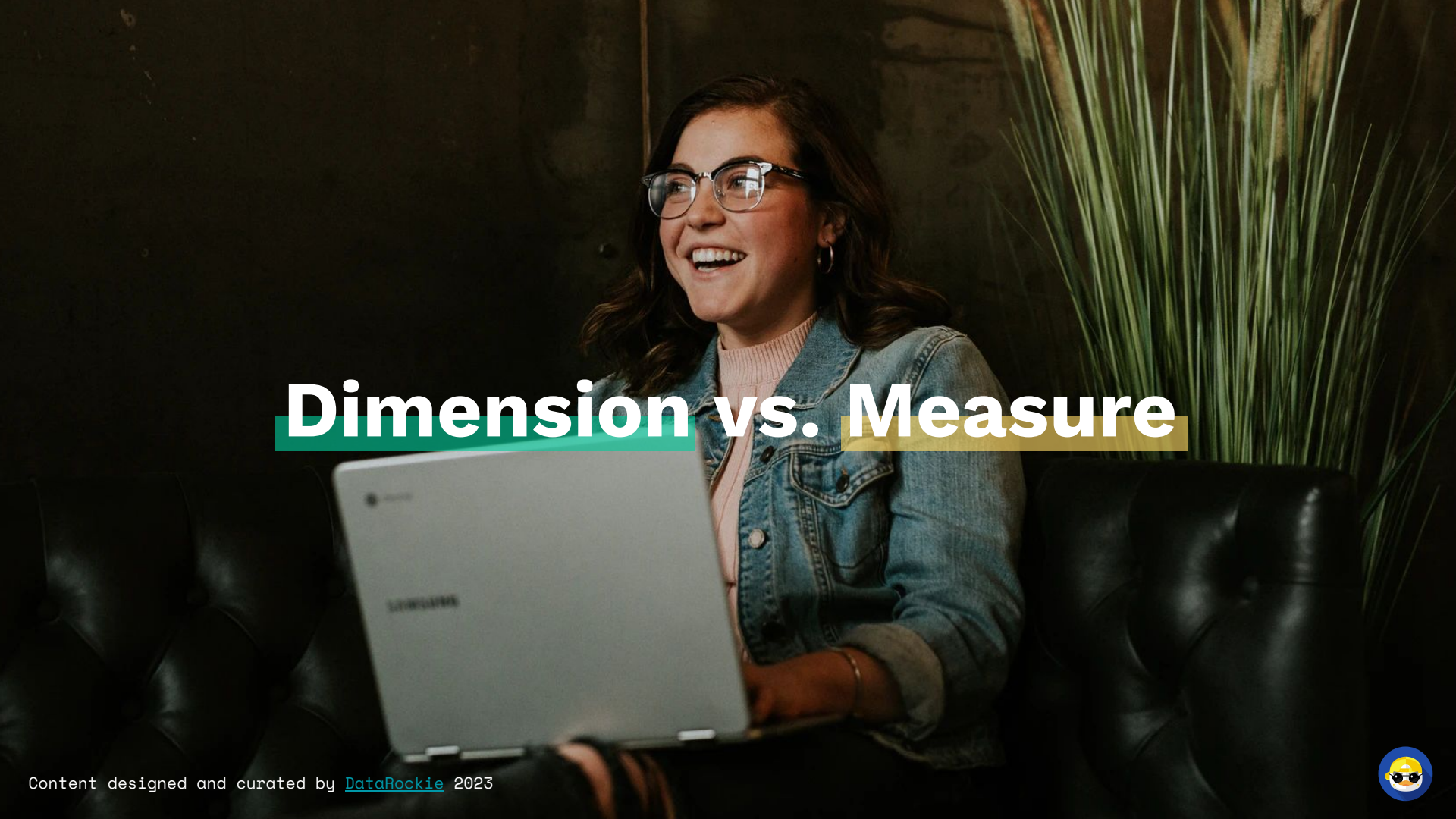
VLOOKUP(lookup_value, table_array, col_index_num, [range_lookup])

EMP_ID	Salary	Branch
1	25000	Bangkok
2	50000	Seoul
3	35000	Seoul

VLOOKUP

```
=VLOOKUP(
   EMP_ID, COMPENSATION, 2, FALSE)
)
```

EMP_ID	Name	Dept	Salary	Branch
1	Toy	DATA	25000	Bangkok
2	John	HR	50000	Seoul
3	Mary	MKT	35000	Seoul



Data analytics

- Dimension : category
- Measures : number

Example

Dimensions

Measures

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
1	Row ID	Order ID	Order Date	Ship Date	Ship Mode	Customer	Customer	Segment	Country	City	State	Postal Cod	Region	Product ID	Category	Sub-Categ	Product Na	Sales	Quantity	Discount	Profit
2	1	CA-2016-1	11/8/2016	11/11/2016	Second Cla	CG-12520	Claire Gute	Consumer	United Sta	Henderson	Kentucky	42420	South	FUR-BO-10	Furniture	Bookcases	Bush Some	261.96	2	0	41.9136
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7	6	CA-2014-1	6/9/2014	6/14/2014	Standard C	BH-11710	Brosina Ho	Consumer	United Sta	Los Angele	California	90032	West	FUR-FU-10	Furniture	Furnishing	Eldon Expr	48.86	7	0	14.1694
8	7	CA-2014-1	6/9/2014	6/14/2014	Standard C	BH-11710	Brosina Ho	Consumer	United Sta	Los Angele	California	90032	West	OFF-AR-10	Office Sup	Art	Newell 32	7.28	4	0	1.9656
9	8	CA-2014-1	6/9/2014	6/14/2014	Standard C	BH-11710	Brosina Ho	Consumer	United Sta	Los Angele	California	90032	West	TEC-PH-10	Technolog	Phones	Mitel 5320	907.152	6	0.2	90.7152
10	9	CA-2014-1	6/9/2014	6/14/2014	Standard C	BH-11710	Brosina Ho	Consumer	United Sta	Los Angele	California	90032	West	OFF-BI-10	Office Sup	Binders	DXL Angle-	18.504	3	0.2	5.7825
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Find total sales

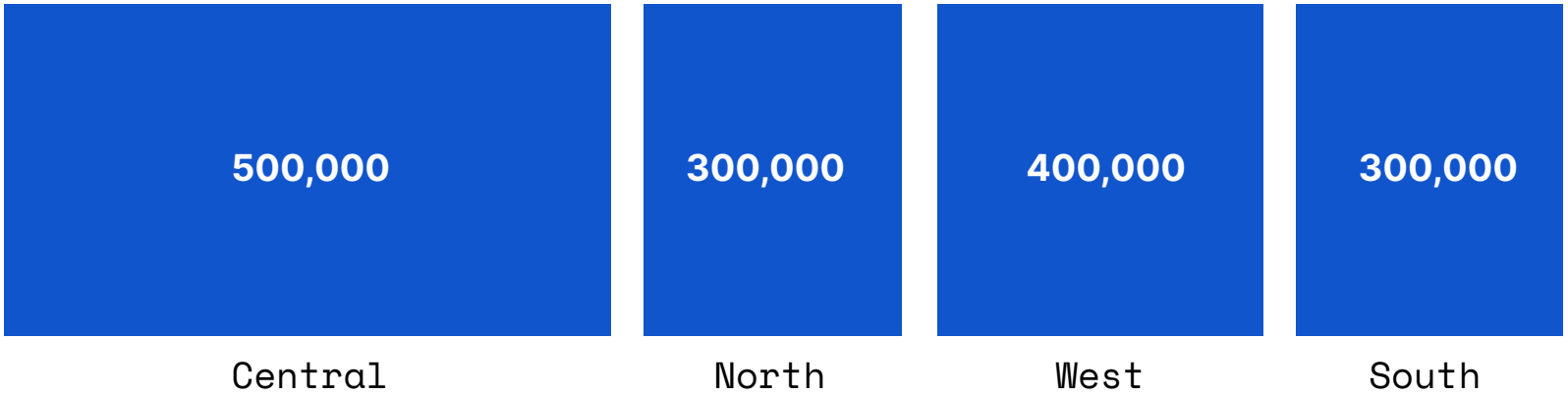
one measure

Slice and Dice

หั่นข้อมูล

Find total sales by region

one measure x one dimension

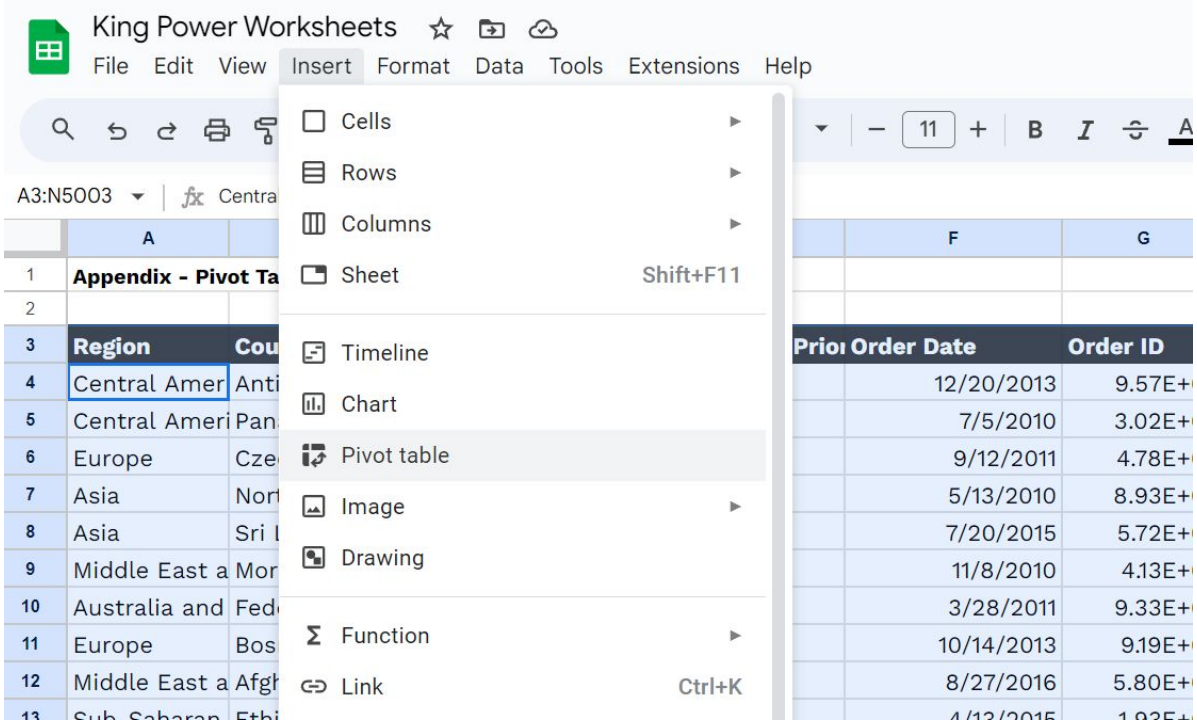


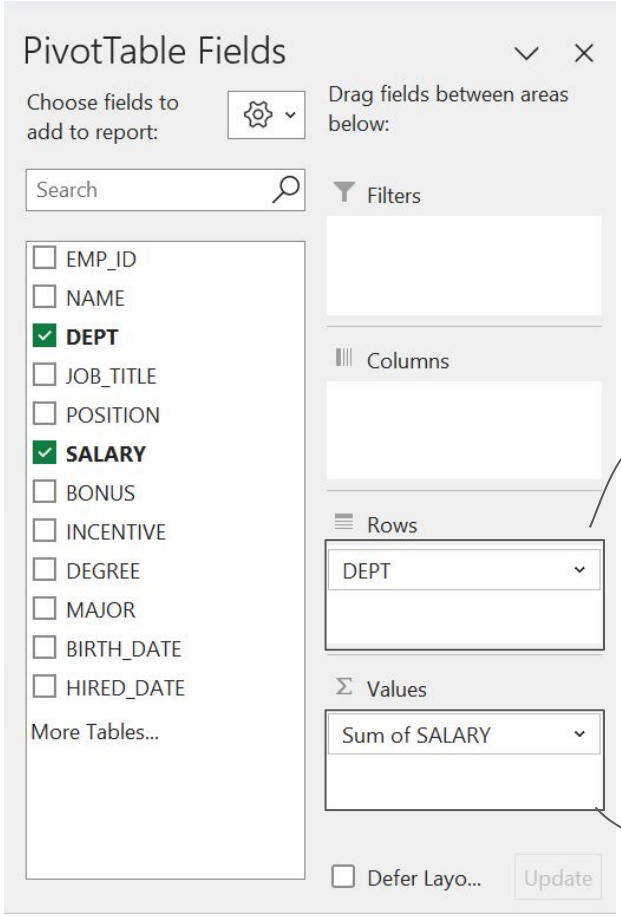

PivotTable
Google Sheets
adidas
XBTO

Reports

Basic formula

Rows: dimension
Values: measure





Dimension in Rows

Row Labels	Sum of SALARY
CEO Office	430000
Data Science	450000
Finance	206000
HR	225000
Marketing	430000
Sales	252000
Grand Total	**1993000**

Google Sheets / Excel work the same

Measure in Values

Regular Expression

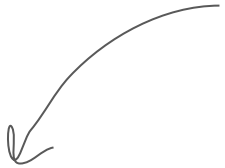
Google Sheets Secret Weapon

You can search for pattern with Regular Expression

Google Sheets is the best! You can use it for free, 0$ cost.

Find G__ S__

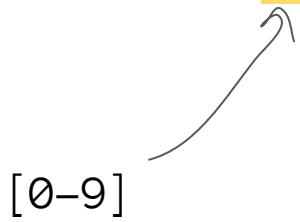
G[a-z]+ S[a-z]+



Google Sheets is the best! You can use it for free, 0$ cost.

Find 0-9 number

Google Sheets is the best! You can use it for free, 0$ cost.



Regular Expression Basics

`^A`	Ant, Amsterdam, America
`s$`	Toys, SNSDs, APPLEs
`c.t`	cat, cot, cet, cCt, c8t

Regular Expression Character Class

```
[ABC]  match A B or C
[A-Z]  match all capital letters
[A-z]  match all letters
[a-z]  match all lowercase letters
[0-9]  match digits
```

Regular Expression Quantifiers

```
*       match zero or more
+       match one or more
?       match zero or one
{5}     match exactly 5 characters
{3,5}   match min 3, max 5 characters
```

Regular expression - Wikipedia

More Examples :)

`[0-9]{5}`	match exactly 5 digits
`apples?`	apple, apples
`^[AB][0-9]{4}`	A1150, B2324, A3599

REGEXMATCH

=**REGEXMATCH**(employee_name, “^[PM]”)

text

starts with P or M

Extract Text

Text	Extracted
I love hamburger	hamburger
I love hotdog	hotdog
I love pizza	pizza
I love onion	onion
I love fried chicken	fried chicken

REGEXEXTRACT

=**REGEXEXTRACT**(text, “I love (food_you_want)”)

text

food you want in ( )

Project - ID Card Parser

We will extract information from this card

ID 3-5522-87666-87-2

Miss. Carry Anna

Date of Birth 18 Jan 1995

Address 967 Tokyo Japan 10880

Expired Date 25 Apr 2025

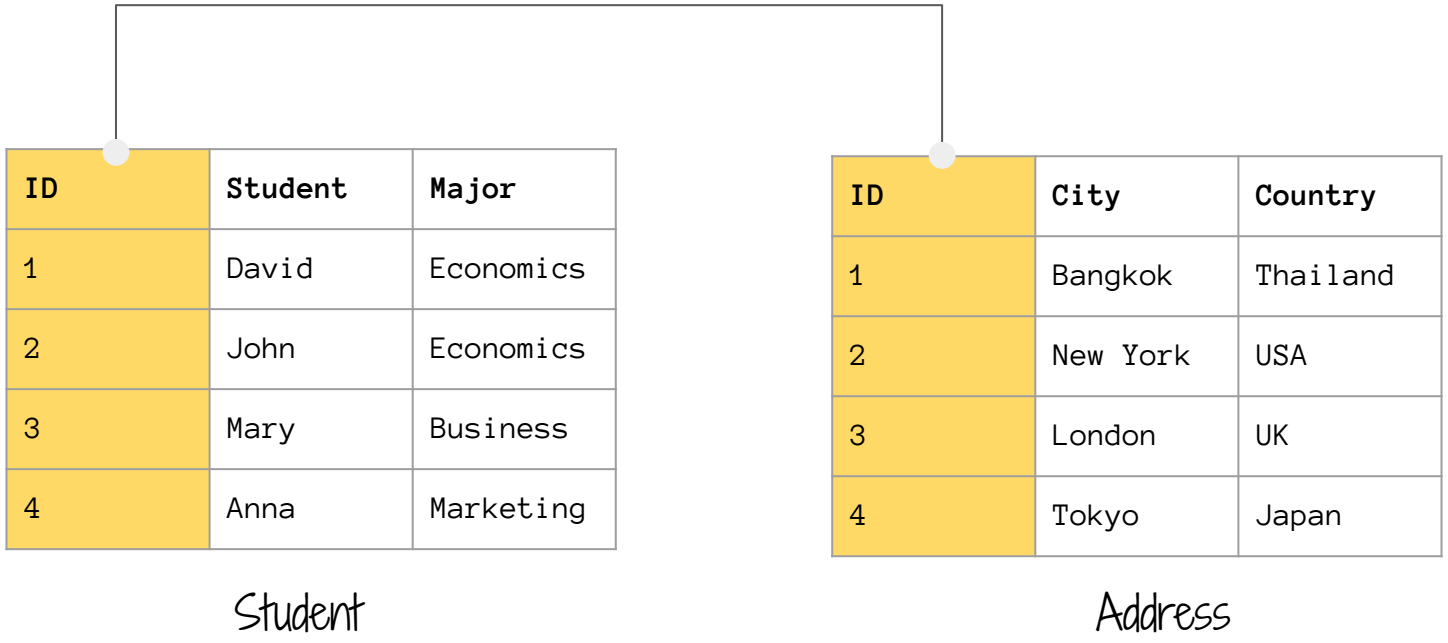
Pro Tip!

The more functions you know,
The more you can do

Appendix

VLOOKUP Detail Explanation

How to join two tables



ID	Student	Major
1	David	Economics
2	John	Economics
3	Mary	Business
4	Anna	Marketing

Student

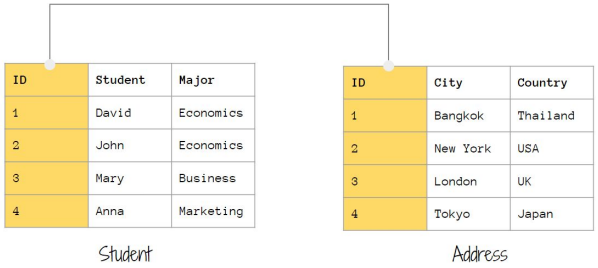
ID	City	Country
1	Bangkok	Thailand
2	New York	USA
3	London	UK
4	Tokyo	Japan

Address

Joined Table

ID	Student	Major	City	Country
1	David	Economics	Bangkok	Thailand
2	John	Economics	New York	USA
3	Mary	Business	London	UK
4	Anna	Marketing	Tokyo	Japan

We can join tables with VLOOKUP



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Student

ID	City	Country
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2	New York	USA
3	London	UK
4	Tokyo	Japan

Address

```
=VLOOKUP( id, address, columns, match )
```

id in student table

lookup table

columns you want

exact match

VLOOKUP

Employee Table

ssn	lastname	firstname	positionID	locationID
000-01-0000	Milgrom	Patricia	2	2
000-02-2222	Adams	Sandy	3	1
109-87-6543	Wood	Emily	2	5
109-87-6544	Foster	Harold	1	3
111-12-1111	Johnson	James	1	3
123-45-6789	Coulter	Tracy	2	1

Location Table (Lookup)

locationID	locationcity	address	state	zipcode	officephone
1	Atlanta	450 Peachtree	GA	30316	(404)333-5555
2	Boston	3 Commons Bl	MA	2190	(617)123-4444
3	Chicago	500 Loop High	IL	60620	(312)444-6666
4	Miami	210 Biscayne B	FL	33103	(305)787-9999
5	New York City	1650 Washingt	NY	15648	(518)256-3100
6	Denver	312 Mount Viev	CO	54657	(205)607-5289
7	Salt Lake City	316 S. State St	UT	84125	(801)459-6652
8	Los Angeles	1400 Main St	CA	94235	(705)639-0227

VLOOKUP

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000-02-2222	Adams	Sandy	3	1
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111-12-1111	Johnson	James	1	3
123-45-6789	Coulter	Tracy	2	1

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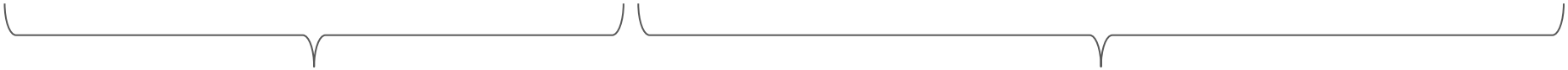
7	Salt Lake City	316 S. State St	UT	84125	(801)459-6652
8	Los Angeles	1400 Main St	CA	94235	(705)639-0227

Final Table (Join Both Tables into One)

ssn	lastname	positionID	locationID	locationcity	address	state	zipcode	officephone
000-01-0000	Milgrom	2	2	Boston	3 Commons Blvd	MA	2190	(617)123-4444
000-02-2222	Adams	3	1	Atlanta	450 Peachtree Rd	GA	30316	(404)333-5555
109-87-6543	Wood	2	5	New York City	1650 Washington Blvd	NY	15648	(518)256-3100
109-87-6544	Foster	1	3	Chicago	500 Loop Highway	IL	60620	(312)444-6666
111-12-1111	Johnson	1	3	Chicago	500 Loop Highway	IL	60620	(312)444-6666
123-45-6789	Coulter	2	1	Atlanta	450 Peachtree Rd	GA	30316	(404)333-5555
222-23-2222	Marlin	2	4	Miami	210 Biscayne Blvd	FL	33103	(305)787-9999
222-52-5555	Smith	1	3	Chicago	500 Loop Highway	IL	60620	(312)444-6666
245-67-8910	Johanson	1	6	Denver	312 Mount View Dr	CO	54657	(205)607-5289
333-34-3333	Manin	1	2	Boston	3 Commons Blvd	MA	2190	(617)123-4444



Employee Table

Location Table (Lookup)

Google Sheets

Foundation for Everything (Else)